## **CLAIMS:**

- 1. A method of optimizing parameter values in a process of producing a product, said process being essentially controlled by a set of n parameters  $X_i$  affecting a set of k properties  $Y_j$  characterizing the product, said method comprising the steps of:
- i) assigning values to a set of k property weights  $w_j$  representing relative importance of said properties  $Y_j$  for the characterization of said product;
- ii) establishing property behavior mathematical relations giving an estimated property  $Y_{e_j}$  for each said property  $Y_j$  in terms of said parameters  $X_i$  from given parameter data and associated property data;
- iii) using said property weights  $w_j$  to establish a goal function in terms of property weighted deviations between the estimated properties  $Ye_j$  and corresponding specified goal values for said properties  $Y_j$ ; and
- iv) minimizing the goal function to generate a set of n optimal parameter values for said/parameters X.
- 2. A method according to claim 1, wherein said product is a composition, said set of optimal parameter values characterizing an optimal formulation for the composition.
- 3. A method according to claim 1, wherein said product is a pharmaceutical product, said set of optimal parameter values characterizing an optimal formulation for the pharmaceutical product.
- 4. A method according to claim 1, 2 or 3, wherein the values for said property weights  $w_j$  are obtained using an algorithm based on an analytic hierarchy process.

- 5. A method according to claim 4, wherein said given property data are obtained through a number *l* of experimental runs of said process using said given parameter data, each said run using a distinct set of values for said given parameter data.
- 6. A method according to claim 5, wherein  $l \ge n+1$ .
- 7. A method according to any one of claims 1 to 6, wherein said goal function is expressed as follows:

$$G(X_i,...X_n) = \sum_{j=1}^k w_j^2 (Ye_j - O_j)^2$$

wherein  $O_j$  are said specified goal values for said properties  $Y_j$ . A method according to claim 7, wherein said minimizing step is performed by successive iterations of:

$$G(X_1,...,X_n) = \sum_{i=1}^k [f_i(X_i,...,X_n)]^2$$

- 8. A method according to claim 7, wherein said goal function is minimized according to one or more specified ranges  $(a_i, b_i)$  wherein  $a_i < X_i < b_i$  for one or more of said optimal parameter values.
- 9. A method according to any one of claims 1 to 8, further comprising the steps of:
- i) performing experimentally said process using said set of optimal parameters values to obtain corresponding experimental values for said properties  $Y_j$
- ii) ranking said set of optimal parameters values over predetermined afternative sets of parameters values for said  $X_i$ .

- 10. A method according to claim 9, wherein said ranking step is performed using an algorithm based on an analytic hierarchy process.
- 11. A method according to claim 9 or 10, further/including the step of:
- i) incorporating said set of optimal parameters values and said corresponding experimental values for said properties  $Y_j$  respectively into said given parameter and associated property data;
- ii) repeating said steps ii) to iv) to generate a new set of optimal parameters values for said parameters  $X_i$ .
- 12. A method according to any one of claims 1 to 11, wherein said product is a pharmaceutical product.
- 13. A method according to any one of claims 1 to 11, wherein said product is a product.
- 14. A method according to claim 13, wherein said step of calculating comprises:
- i) establishing property behavior mathematical relations giving an estimated property  $Y_{e_j}$  for each said property  $Y_j$  in terms of said parameters  $X_i$  from said parameter data and associated property data;
- ii) using said property weights  $w_j$  to establish a process goal function in terms of property weighted deviations between the estimated properties  $Ye_j$  and corresponding specified goal values for said properties  $Y_i$ ; and
- iii) minimizing the process goal function to generate a set of optimal parameter values for said parameters  $X_i$ .

- 15. A method according to claim 14, wherein the values for said property weights  $w_j$  are obtained by an algorithm based on an analytic hierarchy process.
- 16. A method according to claim 13, 14 or 15, wherein l = n + 1.
- 17. A method according to any one of claims 14 to 16, wherein said goal function is expressed as follows:

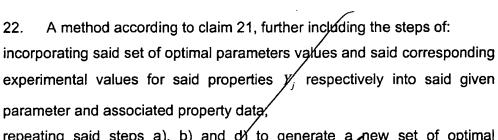
$$G(X_i,...X_n) = \sum_{j=1}^k w_j^2 (Ye_j - O_j)^2$$

wherein  $O_j$  are said specified goal  $\forall$ alues for said properties  $Y_j$ .

- 18. A method according to claim 17, wherein said minimizing step is performed through successive iterations.
- 19. A method according to claim 18, wherein said goal function is minimized according to one or more specified ranges  $(a_i,b_i)$  wherein  $a_i < X_i < b_i$  for one or more of said optimal parameters values.
- 20. A method according/to claim 14, further comprising the steps of: performing experimentally said process using said set of optimal parameters values to obtain corresponding experimental values for said properties  $Y_i$ ;

ranking said set of optimal parameters values over predetermined alternative sets of parameters values for said  $X_i$ .

21. A method according to claim 20, wherein said ranking step is performed through an algorithm based on an analytic hierarchy process.



repeating said steps a), b) and d) to generate a new set of optimal parameters values for said parameters  $X_i$ .

- 23. A method according to any one of claims 13 to 22, wherein said product is a pharmaceutical product.
- 24. A computer program product performing the method according to any one of claims 1 to 23.

